CLAIMS

What is claimed is:

1. An apparatus for enhancing return blood flow in a lower extremity to prevent thrombosis in a human body comprising:

an impedance component disposed at the proximal end of the lower extremity that when activated impedes return venous blood flow by compressing a vein, thereby increasing venous fill in the lower extremity; and

a compression component disposed at the distal end of the lower extremity that is activated in response to deactivation of said impedance component and compresses at least a portion of the lower extremity such that return venous blood flow is enhanced.

2. The apparatus of claim 1 wherein said impedance component comprises a component selected from the group consisting of cuffs, clamps, pistons, bulbs, and a combination of the foregoing.

3. The apparatus of claim 1 wherein said impedance component is activated via mechanical, pneumatic, electrical, or electronic systems.

4. The apparatus of claim 1 wherein said compression component comprises a component selected from the group consisting of cuffs, clamps, pistons, bulbs, sequential compression segments and a combination of the foregoing.

5. The apparatus of claim 1 wherein said compression component is activated via mechanical, pneumatic, electrical, or electronic systems.

6. The apparatus of claim 1 wherein said compression component is disposed at a portion of the lower extremity comprising a location selected from the group consisting of the foot, the ankle, the calf, the lower thigh and a combination of the foregoing.

7. The apparatus of claim 1 wherein said impedance component is activated until blood volume in the lower extremity is maximized, and said compression component is activated in response to deactivation of said impedance component.

8. The apparatus of claim 1 wherein said impedance component is activated to exert a pressure of between approximately 20 and approximately 60 mm Hg.

9. The apparatus of claim 8 wherein said impedance component is activated to exert pressure of between approximately 30 and approximately 40 mm Hg.

10. The apparatus of claim 9 wherein said impedance component is activated to exert a maximum pressure of about 30 mm Hg.

11. The apparatus of claim 1 wherein said compression component is activated to exert a pressure of over about 40 mm Hg.

12. The apparatus of claim 1 further comprising a control unit to control the activation and deactivation of said impedance component and of said compression component.

13. The apparatus of claim 12 further comprising a sensor unit to monitor blood volume and provide feedback to said control unit, and

wherein said control unit coordinates the deactivation of said impedance component and activation of said compression component in response to feedback from said sensor unit.

14. The apparatus of claim 13 wherein the sensor unit is selected from the group consisting of a strain-gauge plethysmography unit, a pressure transducer, an impedance plethysmography unit and a photoplethysmography unit.

15. An apparatus for enhancing return blood flow in a lower extremity to prevent thrombosis in a human body comprising:

means for impeding venous flow in the femoral vein at the proximal end of the lower extremity;

means for compressing at least a portion of the distal end of the lower extremity; and

a controller for controlling operation of the means for impeding venous flow and the means for compressing at least a portion of the distal end of the lower extremity.

16. The apparatus of claim 15, further comprising a sensor for determining the maximal venous fill and providing an input to the controller.

17. A method for enhancing return blood flow in a lower extremity to prevent thrombosis comprising the steps of:

impeding the venous blood flow at the proximal end of the lower extremity for a defined period of time thereby increasing venous fill in the lower extremity; and

compressing a portion of the distal end of the lower extremity, such compression being initiated in a relationship to release of impedance of the venous blood flow at the proximal end of the lower extremity.

18. The method of claim 17, further comprising the step of determining a maximal venous fill in response to impeding the venous blood flow.

19. The method of claim 17, wherein compressing a portion of the distal end of the lower extremity is initiated before, simultaneous with, or after release of, impedance of the venous blood flow at the proximal end of the lower extremity.

5

20. The method of claim 17 wherein the defined period of time comprises maintenance of a maximal venous fill for a defined period of time.